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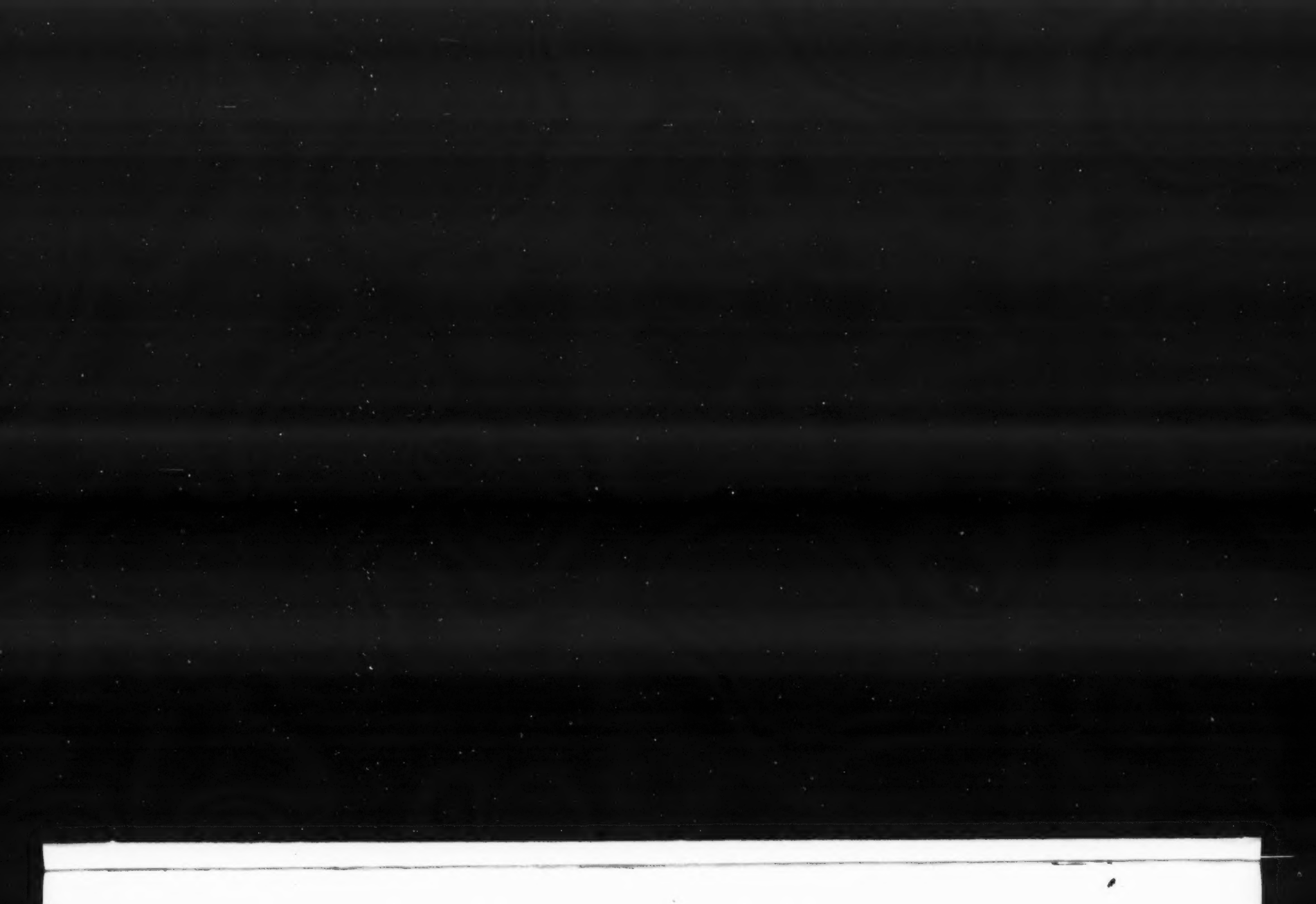

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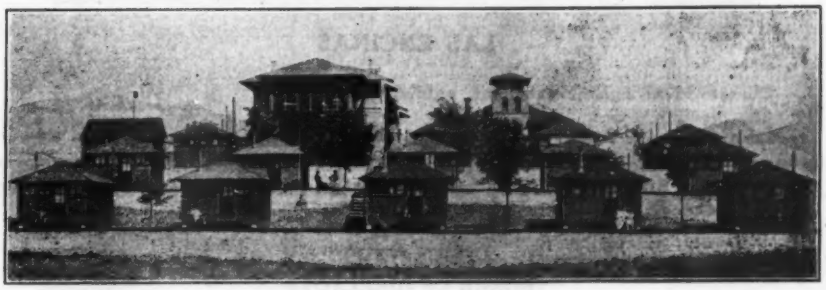

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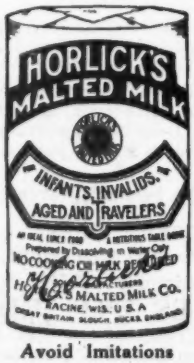

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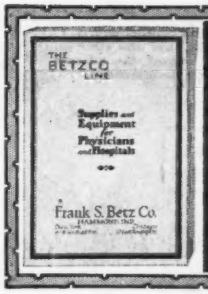

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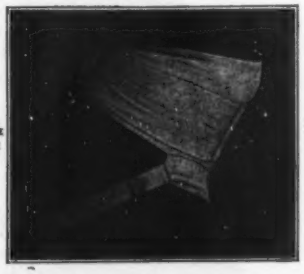

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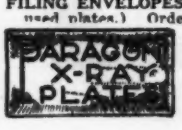

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DELAYED BOWEL MOVEMENT TYPE OF CONSTIPATION*

ERNEST CLYDE FISHBAUGH, M.A., M. D., Los Angeles, California.

During a careful study of four hundred and thirty-seven private patients with symptoms evidently due to chronic constipation twenty-one, or about five per cent, were encountered who gave histories of absolutely regular daily bowel movements. These twenty-one patients had definite symptoms of toxemia. On x-ray examination the motility of the gastro-intestinal tract of these patients showed normal gastric and small intestinal emptying time but a definite retardation in the large intestine. This slowing-up in the colon was not sufficient to produce an absence of daily bowel movements but the retardation was enough to cause each bowel movement to be three or four days behind time. It is to this group of cases that I have applied the term, "Delayed Bowel Movement Type of Constipation."

Motility observation of the digestive tract is essential to the correct interpretation of symptoms in this group of patients. The symptoms are just as profound as those observed in obvious types of toxemia from the intestinal tract. The co-operation of the patient is difficult to obtain unless the physician can demonstrate by serial x-ray plates that there is a definite stagnation in the colon. Once this confidence is obtained the remainder of the therapy is directed toward increasing the emptying time of the large intestine by means of a laxative diet, proper exercise or massage and perhaps mild laxative measures.

It is true that those doing multiple examinations on large series of patients will often find equally as marked delay in emptying of the colon in perfectly healthy people. You have also observed patients in apparently excellent health who have a bowel movement regularly every week, ten days or two weeks. You have also observed patients with profound intestinal toxemia with moderate constipation. The patients included in this series have all been carefully studied and every possible source of intoxication outside of the intestinal tract removed before treatment was instituted. Only patients who have been restored to normal health by methods mentioned above have been included in the twenty-one cases.

Because of the severity of symptoms it would seem interesting to detail the histories of a few of these patients rather than to attempt a symptomatic classification or resume.

CASE NO. 282-35: A woman, aged 34, divorced.

COMPLAINT: Indigestion; attacks of headaches; nausea and very foul breath.

PRESENT ILLNESS: Started about eight or ten years ago following childbirth, when she began to have attacks of headaches, culminating in nausea and vomiting. At that time

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would have an attack about once every two months. About six years ago began to notice a very bad breath. This came on after the birth of her second child. Would occasionally have attacks of severe abdominal cramps followed by diarrhea. If all food was stopped for two or three days the diarrhea would disappear. For two or three years got along fairly well but for the last three or four years she has had a very bad breath about three-quarters of the time. Has a headache on awaking almost every morning. Bowel movements have been very regular; very seldom takes a laxative and then only on "general principles." The first part of the bowel movement is firm but the last portion of it is soft formed. Occasionally has some gas pains. Is considerably under weight, has very little appetite and is tired all the time. The remainder of her history was unimportant.

PHYSICAL EXAMINATION was unimportant.

LABORATORY EXAMINATION: Blood count and urine examination were normal. Stool examination was normal excepting that there was a moderate amount of mucus, with some pus cells mixed in the mucus. Rehfuss test breakfast showed normal acidity. Wassermann test was negative.

X-RAY OF GASTRO-INTESTINAL TRACT: Unimportant with the exception of the motility of the large intestine. Before the twenty-four hour examination patient had had a bowel movement, which, according to her own statement, corresponded to a normal morning bowel movement. Head of the barium column was in the descending colon. The entire colon was well filled and not spastic. Forty-eight hour examination, patient had had three bowel movements since the twenty-four hour examination. There was still a great deal of barium in the ascending and transverse colon. Seventy-two hour examination, patient had had one more bowel movement but there was still considerable barium in the transverse colon. X-ray examination showed a marked delay in emptying of the large intestine.

The patient was put on a laxative diet and within three weeks' time the yellowishness of the sclerae, which had been constantly present for the past few years, had completely disappeared from the eyes. The coated tongue had completely disappeared as well as the bad breath. Patient had begun to gain weight and had lost the constant tiredness and was feeling markedly improved in every way. She has remained well for two years.

CASE No. 2037-40: Man, aged twenty-six.

COMPLAINT: Headaches, attacks of tiredness and lassitude.

PRESENT ILLNESS: Started seven or eight months ago. At that time nothing unusual happened excepting that he was doing some night work. Present illness came on rather slowly. First he noticed that he would go two or three days feeling "rotten" and then would feel better again for a week or ten days. This would be followed by another "pepless" spell. He was confined to the office the greater part of the day. During the past few weeks he has been having frequent headaches. He would frequently awake in the morning with a dull ache across the forehead. At times the headaches would become so severe that he would be unable to think and this would continue for two or three days with no cessation. The severe headaches were always associated with marked tiredness and weakness. During the attacks of weakness would go home so exhausted that we would be unable to sleep, and he would feel dizzy.

GENERAL EXAMINATION was unimportant.

LABORATORY EXAMINATION: Blood count normal. Urine, negative. Rehfuss test breakfast showed normal acidity. Wassermann test, negative. Stool examination, normal.

X-RAY EXAMINATION: Unimportant excepting as it showed marked delay in the emptying of the large intestine.

Although the patient had had regular daily bowel movements, the x-ray showed the descending colon and rectum outlined with barium and barium in the head of colon.

This patient's condition was completely relieved by laxative diet.

CASE No. 2062-15: A business man, aged 43.

COMPLAINT: Tiredness, exhaustion and nervousness.

PRESENT ILLNESSS Patient states that he has not been very robust for fifteen years. Although he has continued actively in business he has not been able to do as much as his business associates. Four years ago had measles and lost considerable weight at that time and has not regained it since. About a year and a half after the measles, began to feel very well and strong. Was able to play thirty-six holes of golf without being tired. Had to stop golf after five months because of an injured elbow. Two months ago began playing again but found that after playing nine holes was completely exhausted. However, he continued about his business. A few months ago first began to observe an acid stomach; lots of gas in the bowels and fermentation. Physician placed him in bed for two weeks on a very limited diet and gradually the bad symptoms disappeared. Since that time, however, he has been very weak. He has very little indigestion and practically no gas. He has no endurance. Walking a few blocks results in shortness of breath and pounding of his heart. Temperature has been subnormal. He has had a variable appetite. Bowel movements have been regular each day. Feels "logy" and "dopey" and very markedly depressed. He has no cause for worry but worries about everything. He tires easily.

GENERAL EXAMINATION showed a rather poorly nourished man with a low blood pressure. Otherwise there was nothing remarkable.

LABORATORY EXAMINATION: Blood count normal. Urine examination and kidney function tests were normal. Basal metabolism test was minus 7.5. per cent. Test breakfast showed normal acidity. Stools normal.

X-RAY EXAMINATION showed the small intestine practically empty in six hours and the colon outlined almost throughout. At twenty-four hours, after a fairly normal bowel movement, the position of barium mass was practically unchanged. At forty-eight hours, although patient had had two more bowel movements, there was only some thinning in the ascending and first half of the transverse colon, the remainder of the colon being fairly well filled with barium mass.

Further observation was impossible as the patient was leaving the city. This man was placed on a laxative diet and mildly laxative measures and within a period of two weeks symptoms above described had completely disappeared and he has continued in the best of health up to the present time.

CASE No. 1782-29: A business man, aged 43 years.

COMPLAINT: Gas in the stomach.

PRESENT ILLNESS: Patient has complained of gas in his stomach since he was ten years of age. Aside from belching and passing flatus there had been little discomfort until the last year. During this time has had a few very severe attacks but never entirely free from distress in the abdomen. Usually severe distress in the stomach is relieved by a glass of hot soda water. When having a great deal of distress in the stomach found relief by going on a milk diet for two o three weeks at a time. When on the milk diet would find it necessary to take laxatives. Otherwise, has not taken a laxative in twenty-five years. He has had a regular bowel movement every day. Patient has had a coated tongue most of the time and also a bad breath. He has not observed any headache. He has felt tired and nauseated. Otherwise his history was unimportant.

GENERAL EXAMINATION: Negative excepting for large, chronically infected tonsils.

LABORATORY EXAMINATIONS Blood, urine and Rehfuss test breakfast were normal. Wassermann test, negative.

X-RAY OF THE GASTRO-INTESTINAL TRACT: Showed appendix well filled and terminal ileum empty at six hours. At the end of twenty-four hours patient said that he had had two normal bowel movements. Colon was very well filled throughout its entire course. Forty-eight hour examination: Patient had had another large bowel movement but the colon remained well filled. Seventy-two hours: Patient had had two more bowel movements but there still remained a well filled appendix and considerable amount of barium in the ascending and transverse colon; showing a rather marked delayed bowel movement type of constipation.

This man was placed on a laxative diet and mild laxative and was completely relieved of symptoms in one week's time and has remained free of symptoms since the examination, three months ago.

CASE No. 1486-48: A doctor, aged 37 years.

COMPLAINT: Attacks of indigestion, weakness marked mental depression, and loss of weight.

PRESENT ILLNESS: Patient states that for a number of years he has had attacks of indigestion which amounted to a fullness, distention and a bad taste in the mouth. These symptoms were relieved by taking a Sedlitz powder. About two years ago attacks became more severe and there was more depression with them and they would last for two or three days. He has been having an attack about every week during the last year and has lost twenty pounds in weight. He has lost all his "pep". Hands have become cold and clammy. Blood pressure has remained about 100. He has had a little edema of the ankles. He has had very marked mental depression in recent months, so much so that it was almost impossible for him to live with his family. He would come home at night so depressed and ill tempered that he would go around and whip all of the children. He had attempted suicide because of this marked mental depression. The patient said that he had no cause for worry but was so tired and exhausted all the time that he would be unable to "get above it." At times during these attacks would have to be in the hospital for from one to two weeks because of the marked weakness and mental depression. He had his appendix removed one year ago in the hope that his condition would be relieved. There has been no improvement since that operation. He has a coated tongue constantly. He never awakens in the morning with a headache or has sick headaches. Odor of the stools is usually foul. He has been examined repeatedly by various physicians and has been x-rayed on various occasions and nothing pathological found. He has daily bowel movements. Otherwise his history is unimportant.

....GENERAL EXAMINATION: Negative excepting for moderate under-nourishment.

LABORATORY EXAMINATION: Test breakfast, urine and stool examinations were normal. Wassermann test was negative.

X-RAY GASTRO-INTESTINAL TRACT: Terminal ileum was practically empty in five hours. Twenty-four hour examination showed the entire colon well filled even though patient had had a normal morning bowel movement. Forty-eight hour examination showed the large intestine still well filled, although the patient had had two large bowel movements since the twenty-four hour examination. At seventy-two hours there was still considerable barium in the colon. Patient had had one bowel movement since forty-eight hour examination.

This man was placed on a laxative diet with mild laxative and did not report for three months. At that time stated that he had not had a single bad attack; that he had gained twenty-five pounds in weight; that his tiredness had completely disappeared; that he had no longer a coated tongue; that the mental depression had gone and that he was again living happily with his family.

CASE No. 1272-40: Lawyer, aged 25 years.

COMPLAINT: Headaches, mental depression, tiredness and stomach trouble.

PRESENT ILLNESS:.. Patient thinks that he has had headaches all his life. Years ago would have headaches at irregular intervals of from one week to two or three months. Recently they have been more severe and more frequent. He has had attacks which would last from one week to a month. Often he awakens with a headache so severe that it will be necessary to stay in bed in a dark room for two or three days at a time. These headaches are frequently associated with severe nausea and vomiting. Attacks have become so severe that he has had to be excused by the court in the course of a trial. There is marked vertigo and faintness at times. Photophobia is usually present during severe headaches. Tonsils were removed one year ago but afforded no relief. There has been considerable indigestion, belching, sour stomach and regurgitation of food. He feels "dopey" and depressed during and between attacks. On two occasions he had purchased lysol with suicidal intent. He has lost several pounds in weight and has a very poor appetite. He has regular bowel movements twice each day, and he has taken no laxatives. Otherwise his history was unimportant.

GENERAL EXAMINATION was unimportant.

LABORATORY EXAMINATION: Urine, blood and stools were normal. Wassermann test was negative.

X-RAY GASTRO-INTESTINAL TRACT: Stomach and small intestine emptied normally. Twenty-four hour examination, patient had had two normal bowel movements. Colon was well filled. Forty-eight hour examination, patient had had two more bowel movements. There was still considerable barium in the colon.

On laxative diet and mild laxatives the symptoms completely disappeared in two weeks' time. This patient has been entirely well for one year.

The other cases are equally as striking in symptomatology, findings and relief, but those just described are quite sufficient to illustrate the intensity of intoxication which patients may have from the intestinal tract with no obvious constipation.

As stated above, this group comprises only five per cent of those patients having symptoms referable to constipation, but it is a group which shifts about from one physician to another without relief. When once recognized their condition is simply cured, usually by diet alone.

CONCLUSIONS

1. By delayed bowel movements form of constipation is meant regular daily evacuations which are two or three days behind time.

2. Motility x-ray examination of the gastro-intestinal tract is essential in: (a) Recognition of this form of constipation: (b) Convincing the patients that their bowel movements are delayed.

3. About five per cent of patients suffering with intestinal intoxication are of the delayed bowel movement type.

BASAL METABOLISM IN CLINICAL MEDICINE*

E. W. ADAMSON, M. D., Douglas, Arizona.

In order to have a clear conception of what is meant by the term basal metabolism, we will first define and consider metabolism as a whole. The products of digestion, absorbed from the gastro-intestinal canal, undergo various transformations in the body. Some are broken down almost immediately into simpler compounds which are then eliminated from the body by the excretory organs; some are stored, either unchanged, or after modification, and are used later as needed, while still others serve to build up the complex living protoplasm of the tissues and are ultimately disintegrated into waste materials. These chemical transformations within the body constitute its metabolism.

In studying metabolism, one may follow an individual food material from the time of its absorption until it is finally converted into waste products. In this way it is possible to speak of a protein metabolism, a fat metabolism, etc. Disturbances in these individual chemical processes

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give rise to definite clinical entities. On the other hand, metabolism may be considered collectively from the standpoint of energy transformations, and thus be termed energy metabolism. The body is a combustion apparatus in which various materials derived from the food are hydrolyzed, oxidized, and otherwise altered by means of special ferments, until they finally liberate energy, which leaves the body mainly in the form of heat. Thus the total metabolism in the body may be expressed in terms of energy, and the heat unit, or calorie, is commonly used for this purpose.

Means of Measurements: May be divided into two general classes (1) direct calorimetry; (2) indirect calorimetry.

The total metabolism may be determined directly by placing the individual in a suitable calorimeter and measuring the heat given off from the body through conduction, radiation, and evaporation, at the same time making allowances for any change in the temperature of the body itself. This is DIRECT CALORIMETRY.

The energy liberated in the body may be calculated if we know how many grams of fat, of carbohydrates, and of protein are consumed in a given time, for each gram in burning liberates a definite and known amount of heat. This method is known as INDIRECT CALORIMETRY. In order to determine the TOTAL metabolism by this method it is necessary to estimate the amount and kind of material consumed in the body. This must be done by a study of the waste products eliminated. The nitrogenous waste in the urine furnishes an index of the rate of protein metabolism. The absorption of oxygen and elimination of carbon-dioxide through the lungs furnishes a measure of the metabolism of carbohydrates, fats, and the non-nitrogenous proteids. The separate amounts of carbohydrates and fats burned are estimated by determining the ratio between the volume of carbon dioxide given off and the volume of oxygen absorbed by the lungs. This ratio is called the *respiratory quotient.*

Direct as well as indirect calorimetry must take into account the fact that heat as well as waste products may be temporarily retained in the body. It is obvious that there might be considerable source of error from a single observation, and equally obvious that with a long period of observations the errors from these sources will lessen.

Physiological Variations: Determinations of the rate of metabolism show that this is subject to quite considerable variations in a given individual. Factors which influence the rate in a normal individual are (1) muscular exercise and possibly other physiological activities of waking life; (2) indigestion of food. Muscular exercise, even of so mild a form as standing, shows a difference from "sitting metabolism," of as much as 17 per cent, and the severest muscular exertion will increase the rate to 9 or 10 times its minimum. Metabolic studies have shown that there is a greater liberation of heat in the body after the ingestion of food, which may last for twelve hours or more and which varies with the class of food taken. The exact cause for this heat production after food has been a subject of much discussion, but experimental work seems to point definitely to the cause as being due to increased motor and secretory activities of the digestive apparatus, and to some effect produced by the products of digestion AFTER they have been absorbed from the gastro-intestinal tract.

Basal Metabolism: It is obvious that since the rate of metabolism is subject to marked physiological fluctuations, any determination that will be useful for purposes of comparison must eliminate, so far as possible, the effects of exercise and food. For this reason such a determination must be made (1) when the individual is fasting in the morning, 14 to 18 hours after the last meal; and (2) with the individual in as complete muscular

and psychic repose as possible. Even this is not the lowest level of bodily energy, as it has been shown to be still lower during sleep. However, it furnishes a convenient basis for computation and comparison.

Methods and Standards: Since heat is the end-product of all vital transformations, the latter could, theoretically, be best measured by some method of determining DIRECTLY the heat given off from the body, but this calls for such an extremely elaborate and costly apparatus, that its mere appearance would be so formidable as to completely unnerve the best of hospital technicians, and is not practical. Fortunately, the indirect methods are available and less awe inspiring. Heat being the result of combustion, and oxygen intake and carbon-dioxide elimination being factors of this transformation, a fairly accurate determination of these factors gives a close estimate of the total heat production, and the end result of glandular and muscular activity is thus indirectly secured. The final outcome of many years' experimentation and study has been the development of portable respiration apparatus that measure with accuracy and great rapidity the oxygen consumption of human beings. This is now accomplished with a relatively simple technic, involving neither respiration chamber, valves, weighings nor gas analysis, as it has been found that the oxygen consumption alone is of prime importance in the vast majority of pathological cases, and that it is of no practical importance to estimate the carbon-dioxide elimination.

Considerable discussion has been evoked by the auxiliary factors to be taken into consideration, such as body surface, weight, age, sex, height, degree of nourishment, barometric reading, room temperature etc., etc. Finally, however, out of the wilds of all this argumentation, the absolutely essential factors have arrived at their proper levels and are furnished in tabulated form with the apparatus. We now, however, find ourselves in somewhat the same situation as regards metabolism that we were with radiographs, i. e., the difficulty of properly interpreting the findings and their proper relations to the other clinical manifestations of the case, so that we may be in a position to draw deductions that are correct. This may be a matter of no small moment, for, since they may influence for or against operative procedure, erroneous conclusions may actually be of serious harm. We shall, therefore, be obligated to pursue an intensive course of study of the significance of respiratory metabolism so that we may obviate the human error when we apply the tests to pathologic states. This idea of the subject is by no means a simple one and considered beyond the scope of such a paper as this; in fact, it is a subject only to be acquired by individual study, carefully done and frequently repeated, and then, as every new departure of science, the greatest knowledge will be acquired by actual, painstaking experience. It is far better to make NO metabolism tests than to make or interpret them inaccurately.

Clinical Application: For the present the greatest practical clinical application of metabolic estimations seems to be concerned with departures from the normal function of the ductless glands, notably the thyroid. It being well recognized that one of the main functions of the thyroid is to regulate the intensity of combustion within the body, it follows that when the gland is overactive the basal metabolism would be increased, and when underactive, decreased. The order of magnitude of these changes is somewhere in the neighborhood of an elevation of from 20 to 40 per cent in mild, 40 to 60 per cent in moderate, and 60 to 100 per cent in severe hyperthyroidism, and a drop of from 20 to 40 per cent in myxedema. Thus the determination of the basal metabolism in thyroid cases constitutes essentially a functional test of that gland. Just as the progress of a febrile disease is rendered more easy of visualization by the

graphic clinical chart, so a graphic metabolism chart helps visualization of progress in thyroid disease. The febrile case chart takes cognizance of three factors—pulse, temperature and respiration; the thyroid chart also consists of three curves, i. e., pulse, basal metabolism and body weight, and such charts when embracing a period of months, present at a glance a striking picture of such patient's progress. However, it may be stated that metabolism determinations in thyroid cases is a refinement rather than a necessity. We could, perhaps, take reasonably good care of typhoid cases if we were deprived of the clinical thermometer; so we can with our thyroid cases without a metabolism apparatus. But, provided they are carefully made and correctly interpreted, they will add a quantitative aspect to the impression of the case that will, to say the least, be of assistance in determining the effects of treatment, either those measures in hyperthyroid states, which are designed to reduce thyroid activity, or thyroid therapy in hypothyroidism. In the latter, particularly, they aid in determining the exact dose of the gland substance which is necessary to cause the patient's metabolism to assume and stay at a normal level.

Outside of thyroid diseases, the metabolic determination as a diagnostic procedure or functional test does not as yet seem to play an important role. Up to date the calorimetric methods are not of fundamental importance clinically, but belong as yet primarily to the research branch of medicine. One other direct clinical application, however, is in the matter of obesity. Published studies have shown that in simple obesity the basal metabolism is normal. Such obesity is due to a disproportion between food intake and bodily activity, and not to any fundamental change in the rate of combustion in the body. In such persons the giving of thyroid raises the metabolism to an abnormal level, producing, in other words, an artificial hyperthyroidism. The treatment, then, of simple obesity with thyroid therapy would appear pernicious, relieving one evil by creating another. By means of metabolism, the case of simple obesity can be differentiated from that due to endocrine disease. This applies not only to hyperthyroid obesity, but to pituitary as well, for in hypopituitarism there is a reduction in the metabolism level, just as in hypothyroidism, though perhaps of lesser degree.

Of diseases other than the thyroid and pituitary, in which there are alterations in the basal metabolism, the most striking are leukemias and severe anemias—notably pernicious anemia. The significance of these changes, however, is as yet not clearly understood, and they have at present no routine diagnostic or therapeutic bearing, although it is quite likely that later they may have.

The basal metabolism in acute febrile and infectious conditions has been considerably studied, but the results are more of academic interest than of value to the clinician.

In conclusion, I will present excerpts from the opinions of various men, as follows:

George W. Crile: "We feel that the best guide, after all, is the judgment of the surgeon or physician. For example, the basal metabolism rate will tell you how much reserve there is in the myocardium, in the liver, and in the central nervous system."

Charles H. Mayo: "After all, the importance of the subject relates mostly to chronic diseases, and especially to diseases of the thyroid, * * * Enough is now known concerning the thyroid, its function and diseases, so that in severe types of hyperthyroidism, basal metabolism determination, while not the sole indicator of severity, is of importance considered with the symptoms. Without it, psychoneurosis might be classified in the category of hyperthyroidism."

A. E. Rousell: "Many cases of hypotension are unrecognized. Some of them with edema and albumen and casts in the urine, will necessi-

tate the estimation of the basal metabolism for a correct diagnosis, just as a study of the blood chemistry is necessary in some forms of nephritis. The study of the basal metabolism is an important adjunct to the practice of medicine, as are other methods of precision, and, just like these other methods of precision, it has its limitations."

Henry S. Plummer: "It is the obligation of everyone interested in thyroid surgery to avoid the error of accepting basal metobolism as an index of the operability of the patient. It is the status of the patient relative to basal metabolism that is of much significance in determining operability of the patient. It is the most fundamental measure of the patient's condition."

Summary: In the review of the present day knowledge of the subject it would seem safe to make the following comments:

(1) Basal metabolism can furnish us with a quantitative test of the activity of the thyroid, and enable us to visualize the progress of patients with thyroid disease, to control fairly accurately the treatment of them, and will aid in clinching the diagnosis in certain border-line diseases.

(2) It has thrown light on the nature of obesity and furnishes us with a means of distinguishing between simple and endocrine obesity.

(3) It must be used only as an auxiliary in determining for or against operative procedure.

(4) Ability to correctly interpret and apply findings must be acquired as thoroughly as the technic of using the apparatus.

(5) Considerable information of practical application in certain chronic diseases may be confidently anticipated.

HENOCH'S PURPURA; REPORT OF A CASE*

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For the purposes of classification, purpura may be divided into two groups: first, idiopathic or primary, in which there is no associated disease or known toxic condition present; second, symptomatic or secondary, in which the symptom complex is dependent upon the presence of a definite pathological entity. Both of these groups may be further subdivided into simple and hemorrhagic purpura. In the latter there is a definite diminution in the number of blood platelets present, while in simple purpura there is no alteration in this element of the peripheral blood. Belonging to the simple idiopathic group, is that peculiar condition known as Henoch's Purpura, or purpura abdominalis, a disease characterized by recurrent attacks of purpura, associated with abdominal symptoms such as pain, vomiting and, occasionally, diarrhea.

The first accurate description of this condition was made by Henoch[1] of Berlin in 1874, although Osler[2] states that the first case to be described is contained in Willan's work on cutaneous diseases, published between 1796 and 1808. A rather superficial review of the literature available would indicate that the disease is of infrequent occurrence. In four large general hospitals, idiopathic purpura occurred 192 times among 336,478 admissions, covering an average period of 29 years. In 194 cases of idiopathic purpura analyzed by Pratt[3], Henoch's purpura occurred 45 times. Comparing the two series, it will be seen that Henoch's purpura occurs about once in 8,000 cases,—rather a low incidence.

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Henoch's purpura is principally a disease of childhood, the great majority of cases occurring before the age of puberty, although cases have been reported in adults of 40 to 50 years of age, Tice[4] having seen a typical case occurring in a woman 59 years old. Males are more frequently affected than females in the ratio of nearly three to one. Heredity seems to play no part in the etiology of this disease, while season and environment are equally without significance.

As the above classification indicates, there has been found no well defined, causative agent, nor are the symptoms explainable by the co-existence of any infection, constitutional disease, or known toxic condition. Some general vascular injury is probably responsibl for the condition, due possibly, to an endotheliolysis such as that described by Gay and Southard in their studies on anaphylaxis. This view gains further support in the very frequent association of those vasomotor disturbances, such as, edema, urticaria and erythema, with idiopathic purpura. In the angioneurotic type of purpura, particularly, the symptoms very closely resemble an anaphylactic reaction. Infection has been held responsible by many investigators, but repeated blood cultures have given uniformly negative results.

An attack is usually ushered in by a fever, which may reach 102.2°, accompanied by pain in the joints, particularly the wrist, knee and ankle joints. Several joints may become involved in succession, and the clinical picture suggest an acute articular rheumatism.

Puffiness about the joint is very common. In a few days, sometimes in a few hours, a purpuric rash appears, principally upon the extensor surface of the extremities, although the face and trunk may be involved as well.

The cutaneous lesions consist of rounded or oval, purplish spots, which vary greatly in size, and which do not disappear on pressure. They gradually fade and pass through all the stages of a contusion before disappearing, which usually occurs within a few days.

The most distressing symptom is abdominal pain, which is colicky in character, and which is usually referred to the region of the umbilicus. It may be accompanied by vomiting, the vomitus containing blood in those instances in which there has been hemorrhage into the digestive tract. When the latter condition is present, melena also occurs, either with or without diarrhea. Tenderness and rigidity are occasionally present in the epigastrium. According to Osler[5], the abdominal pain is associated with a localized urticarial edema of the gastro intestinal walls, a condition which has actually been found at operation during an attack of colic.

Minot and Lee[6] state that the infiltration of the intestinal walls by serous or sero-hemorrhagic fluid may be so extensive as to change the intestinal tube to the size and consistency of a piece of rubber garden hose. Such a condition would predispose to obstruction, either by occlusion or intussusception.

Hematuria is of frequent occurrence, the blood coming, in the great majority of cases, from minute foci of hemorrhage in the kidneys. An edema about the uriniferous tubules may so depress the renal function as to cause a considerable albuminuria. The blood picture is negative except for a moderate leucocytosis, the white count rarely exceeding 14,000. There is no diminution in the number of blood platelets and the coagulation time of the blood is not prolonged as is the case in the hemorrhagic form of purpura. An enlargement of the spleen is occasionally found.

The attacks last from a few hours to several days, and the duration of the entire illness, which is made up of several attacks, averages about one month. Recurrence is common, often at such frequent intervals as to justify the recognition of a chronic form.

The most common, as well as the most serious, complication of this disease is acute nephritis. In the series studied by Pratt[7] it occurred in nearly 50 per cent of the 43 cases. Christian[8] is of the opinion that the renal disturbance is not to be classified as a true nephritis, for it is a rare thing to see a case develop chronic nephritis, even when the primary condition in the kid-

ney was apparently very severe. However, no matter what the underlying pathology may be, uremia does occur in certain rare instances, although it should be noted that uremic symptoms may be due to cerebral hemorrhage or a localized cerebral edema. Among the rare complications may be mentioned cerebral hemorrhage, pericarditis, endocarditis, pleuritis, intussusception, etc.

The occurrence in a child of arthritic pains, visceral crises, and purpuric rash, should render the diagnosis easy. However, the preponderance of any one symptom may be misleading. For instance, when the arthritic pains are severe, and especially when several large joints are involved in succession, it may be mistaken for acute articular rheumatism. It will be remembered, however, that purpura is very rare in rheumatism and that the visceral crises are lacking.

The cutaneous lesions may be closely simulated in serum disease, but a history of serum administration can be obtained and the illness will consist of a single attack.

The dominant feature of the disease, abdominal colic, should serve to differentiate it from the other members of the simple idiopathic group, although at times this may not be possible, since they are so closely related that it is probable they merely represent different degrees of the same disease.

The association of visceral crises with initial constipation, later melena, abdominal tenderness and rigidity, may lead to the mistaken diagnosis of intussusception or other acute abdominal condition, but the intermittent character of the attacks with the presence of a purpuric rash and arthritic pains, should serve to clear up the diagnosis. It is of the utmost importance, from a surgical standpoint, that the differentiation be made, for cases of Henoch's purpura have come to operation under the mistaken diagnosis of appendicitis, acute intestinal obstruction, etc. Therefore, Henoch's purpura should be eliminated from the diagnosis, before operating upon any child with acute abdominal symptoms.

The prognosis of Henoch's purpura is excellent, especially in the young. Herbert French [9] states that recurrences cease in nearly all cases at the age of puberty. The great majority of fatal cases occur as a result of the renal complications, Minot and Lee[10] stating that a mortality of 5 per cent may be expected from this cause. Since some grade of nephritis is found in practically 50 per cent of all cases, it will be seen that recovery from even this complication is distinctly the rule. Albuminuria may persist for some time without other symptoms. Less frequently, death is due to cerebral hemorrhage, or intussusception.

The treatment of this condition is entirely symptomatic. Since exercise and the upright position favor the occurence of the cutaneous hemorrhages, rest in bed is of the greatest importance. This measure and physiological rest of the gastro intestinal tract by a properly regulated diet, seems to lessen the severity of the visceral crises. Drugs, apparently, have very little effect upon the course of the disease, although frequently repeated doses of sodium bicarbonate seemed to afford considerable relief in the case to be reported. For this I can offer no adequate explanation.

CASE REPORT

The patient, a school girl, 6 years of age, of Irish-American parentage, was first examined by me on December 2, 1920. She complained chiefly of swollen, slightly painful joints, severe colic and vomiting.

Her past history was essentially negative except that her mother said the child had always been nervous and subject to frequent attacks of urticaria, especially in the colder weather.

The family history was negative except for the nervous temperament displayed by all the brothers and sisters, two brothers and two sisters—and the occasional urticarial attacks to which they are all subject, not to the same extent as the patient, however.

The present trouble began six days ago, at which time the mother noticed that the child was very nervous and flushed, as if she had a high fever. The following day she noticed that the feet and ankles were covered with red blotches which later became black and blue.

The feet, ankles, and back of the hands were swollen, but the accompanying pain was slight. The child complained of an occasional stomachache of moderate severity. Several days later the pain became severe, at times

extreme, and was accompanied by vomiting, first of food, and later of a greenish fluid which was apparently bile admixed with the gastric fluid. Microscopically, there was no blood in the vomitus. The pain, which was colicky in character, was constantly referred to the region of the umbilicus. The attacks of colic were intermittent, lasting, as a rule, several hours at a time, with intervals of comparative comfort. No record of the number of attacks was kept, but they occurred with varying frequency over a period of six weeks. The bowels were constantly constipated. No blood was ever noted in the stools.

November 30th, a swelling appeared in the lumbar region just to the left of the spine. This swelling was extremely tender and any motion of the part, or pressure thereon, caused her great pain. It persisted for 4 or 5 days and then disappeared without leaving a trace.

PHYSICAL EXAMINATION: The patient was a bright, alert, but rather poorly nourished, and frail looking girl. The tongue was slightly and uniformly coated. No tremor. At the first examination no pathological or abnormal signs were found in the heart or lungs. On December 15th, there was a roughening of the first heart sound, heard at the apex, but more pronounced in the 3rd intercostal space just to the left of the sternum. It disappeared in three days. Examination of the abdomen was negative except during an attack of colic when there would be tenderness and slight rigidity in the epigastrium. The spleen was not palpable.

There was a very tender, swollen area in the left lumbar region, extending from the 12th rib above to the crest of the ilium below and to about the post-axillary line laterally. The swelling was not marked and could rather be referred to as a fullness on that side. It did not pit on pressure, nor was there any discoloration of the overlying skin.

On December 17th the extensor surface of the feet, lower legs, hands and forearms were covered with a purpuric rash. The spots, which varied in size and morphology, did not disappear on pressure. At first of a bright red color, they later became purplish, then yellow, and finally disappeared completely. There was a distinct puffiness of the extensor surfaces of the hands and feet which lasted several days.

The temperature ranged from 98.6 to 102.0 but was usually about 99.6. The pulse rate varied from 90 to 100 per minute. The coagulation time of the blood was not prolonged beyond normal limits. Unfortunately, the facilities for making a blood count were not at hand. Examination of the urine on December 8th disclosed a trace of albumin, with many red blood cells and occasional pus cells, but no casts. A later urinalysis, performed on December 17th, revealed an occasional granular cast and pus cell, but no albumin.

A diagnosis of Henoch's purpura was made, based upon the following summary of the clinical findings:

1. A recurring purpura.
2. Joint involvement, with only slight pain and trivial fever.
3. Recurring attacks of abdominal colic localized about the umbilicus.
4. Hematuria.
5. A history of frequent urticarial attacks.
6. The age incidence.

Treatment consisted of general measures, such as, rest in bed, light, soft diet, fresh air and sunlight. Calcium lactatate seemed to have no effect in preventing recurrences of the purpura. Frequently repeated doses of sodium bicarbonate did seem to moderate the severity of the abdominal colic.

By January 1, 1921, the patient was free from symptoms and gaining strength rapidly. She was seen recently and there has been absolutely no recurrence of symptoms to date.

COMMENT: The only unusual features in this case were the lumbar swelling and the roughening of the first heart sound, both transitory. The significance of both of these conditions would be merely conjectural on my part. The former may possibly have been due to serous effusion between the fascial planes of the lumbar muscles. The latter may have been a localized edema on one of the valve leaflets or possibly merely a functional murmur without significance.

CONCLUSIONS: 1. Although of infrequent occurrence, Henoch's purpura should be borne in mind, that it may not be confused with certain surgical conditions of the abdomen, which it sometimes closely resembles.

2. The urine should be examined frequently for evidences of acute nephritis, since this is the most common, as well as the most serious complication of this disease.

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ROENTGEN FINDINGS IN THE COMMON BONE LESIONS*

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Although there is an axiom in the x-ray study of bones that only two changes, namely, bone destruction and bone reproduction, can be demonstrated on the plate, many indeed, are the variations in these two basic processes. When one considers the point of origin, the nature of the destruction as to path of extension and the portion of the bone involved, the character and situation of the new bone formation, whether endosteal or periosteal, and its arrangement, multiplicity of lesions and relation to soft tissues, it becomes evident that an enormous number of combination pictures are presented, which furnish a radiograph that is usually pathognomic of the lesion observed.

One is impressed by the high percentage of correct diagnoses roentgenologists can make from plates alone. Such ability demonstrates that there are certain well-defined characteristics of the radiograph which allow of pretty accurate differentiation of the disease processes in bone.

It is these fundamental, or type, variations in the X-ray picture in the common bone lesions of osteomyelitis, syphilis, tuberculosis and malignant bone neoplasms that I wish to present, together with a brief interpretation of the underlying pathological changes.

In osteomyelitis, the blood supply of the bones determines localization of foci of infection. Many metaphyseal arteries perforate the epiphyseal cartilage and end as terminal arteries in the epiphysis. These persist up to the termination of bone growth. Then the diaphyseal or shaft group become relatively smaller and smaller with advancing age. There is less narrowing of the mataphyseal and epiphyseal groups as age advances, with consequent increase in the vascularity about the joints. The terminal arteries of all three groups end near the epiphyseal line, hence, here will develop most foci of infection.

Pyogenic osteomyelitic infections are usually embolic. When metaphyseal or epiphyseal arteries become blocked, there develops a wedge-shaped area beneath the cartilage or periosteum. In the phalanges the diaphyseal arteries are relatively large, hence infection usually starts in this portion.

The earliest evidence of acute osteomyelitis upon the X-ray plate is an area of lessened density within the cancellous bone or within the medullary cavity. But, pathologically and usually clinically, this is a comparatively late change. It is commonly seven to ten days from the onset of acute symptoms before this picture appears. If during this roentgenologically negative period the medullary cavity be opened, it will be found filled with pus, as are also the Haversian canals; the periosteum will be inflamed and even the skin reddened, but still no bone destruction.

The inflammation extends rapidly along the medullary canal, over the path of least resistance. The pressure becomes excessive and the exudate emerges through the Haversian canals, quickly killing the fibrous tissue, but the calcium salts are removed only by granulations, which are a reparative process. Hence the roentgenologically latent period.

Bone absorption has been shown to be almost entirely due to direct action of fixed cells, the osteoclasts. These cells probably produce an acid medium in contact with the cell by which bone is dissolved.

The surface of dead bone that is adjacent to living bone becomes extensively eroded by the action of the granulations arising from the living

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bone, but surfaces of dead bone remote from living bone and its granulations show little evidence of destruction. Erosion of dead bone gives a blotchy reduction in density in contrast to the even reduction in density of atrophied living bone. Atrophy in the cortical portion shows longitudinal striae due to the dilated Haversian canals. Dead bone about the opening of a sinus, that is constantly bathed in toxins and pus, thus preventing granulations, is apt to show very slow absorption.

As the pus emerges through the Haversian canals at multiple points, it leaves intervening areas of comparatively normal bone. This is diagnostic. These areas become sequestra and maintain their density much longer than the neighboring living bone, which is subject to the added factors of toxic rarefying osteitis and atrophy of disuse. The greater density of dead bone, its sharp, irregular outline, and the presence of a line of demarcation are points of greatest assistance in determining viability.

The periosteal reaction in osteomyelitis is characteristic. The proliferation of this normally invisible membrane may be among the earliest signs. The infection, having extended through the canals, raises it as a blister from the cortex. Being at the periphery of the inflammation where the toxin is less virulent, the stimulation causes early deposit of calcium salts. These are light and fluffy, giving a sort of "cotton-ball" appearance. Exaggeration of this condition may give the appearance of a shaft actually expanded. It will be noted, however, that an area of uncalcified inflammatory tissue separates this deposit from the shaft, which is still present.

If the infectious process be limited to the cancellous portion, the granulations may permeate the interstices of the sequestra, giving a fairly uniform reduction of density, while multiple foci of infection may cause a blotchy reduction in density of the living portion, thus reversing the commoner picture that has been described.

Brodie's abscess is seen as a definitely circumscribed area of destruction in the cancellous bone on the shaft side of the epiphyseal line.

Generally speaking, in pyogenic osteomyelitis bone destruction and bone production are about equally in evidence. When the infectious agent is of low virulence, the latter predominates and the picture is one of localized or generalized osteosclerosis. The compact bone shows vacuolated areas uniformly distributed through its substance, with occasionally a small, dense sequestrum in the center. It is essential that such be located, as the surgeon contemplating grafting or transplanting will wish to know of their presence.

The determining factors in the localization of tuberculosis in bone are extremely varied and many explanations have been advanced. Generally stated, from the standpoint of the pathologist, there is a preponderance of evidence to show that, commonly, the primary focus in bone occurs within the epiphysis, or less frequently in the metaphysis. Roentgenologically, the findings point to a much greater incidence of primary focus within the synovial membrane. Pathological evidence to combat this latter supposition is necessarily obtained comparatively late in the disease, if obtained at operation, and if at autopsy, is apt to represent terminal lesions. The routine X-raying of sprains and contusions about joints is giving early evidence in the development of tuberculosis not previously available.

The localization of this infection about the joints can be explained to some extent by the distribution of blood supply previously noted. The presence of synovial membrane and of the red marrow of spongy bone are probably the greatest determining factors in this process. The synovial membrane, with its folds and the freely anastomosing lymphatics beneath, becomes a vulnerable point for the commoner lymphogenic

infection. The many reticulo-endothelial cells ,or macrophages, within the venous spaces of the red marrow, proliferate and collect about blood borne bacilli, which may develop into an epiphyseal focus.

The earliest X-ray evidence commonly seen is a haziness about the joint. This is accompanied by soft tissue swelling and some widening of the joint space, due to fluid within it. When compared with the corresponding joint the picture appears roentgenologically poor. Soon the growing epiphyses show squaring and enlargement. This squaring is not confined to the particular epiphysis that may later show necrosis, but involves the contiguous epiphyses as well. Similarly, the bones of the carpus and tarsus show advanced development over the normal side. After the period of growth the same infection shows a characteristic reduction of volume and clubbing together. Next, the joint space will be seen to become narrowed, due to the absorption of the articular cartilage. Thence the infection spreads to the cancellous bone, giving an irregular and worm-eaten appearance, leaving no areas of normal bone. There is usually a considerable period, however, before these areas of decreased density appear. This is probably due to the fact that the tuberculous granulations surround the trabeculae and cut off their nutrition, but very slowly absorp them, giving the so-called bone sand, which cannot be distinguished on the plate from the original trabeculae. This phenomenon may account for the fact that many foci really primary in the epiphysis do not show up until after evidence of intra and periarticular infection are well in evidence. Occasionally the granulations cut off a portion of the cancellous bone en masse, thus forming a sequestrum within a necrosed area, thus simulating a pyogenic osteomyelitis.

A very characteristic feature is the general decreased density of all the bones about the infection. This is a regional atrophy due, primarily, to disuse, but partly to alteration of the circulation and toxicity of the part, and appears from the third to the fourth week of the infection.

New bone formation about an infected joint practically excludes tuberculosis.

Caries sicca, described by Virchow as a luetic manifestation, but since proven to be tuberculosis, is a localized rarefying process in cancellous bone, of gouged-out appearance, of slow progress and without abscess formation. It is commonest in the head of the humerus.

Primary tuberculosis of the shaft is rare. It is usually chronic, localized, and, contrary to type, may be accompanied by periosteal proliferation and simulate chronic pyogenic osteomyelitis.

The earliest evidence of tuberculous spendylitis is probably an erosion of the articulating surfaces of the bodies. This is not usually observed however, and the first obvious change consists of areas of rarefaction within the bodies. The disk is very resistant, until its nutrition is cut off, when it rapidly absorbs, the intervertebral space narrows, and the superimposed body weight compresses the bodies. This causes an anterior angulation, but as the transverse processes are seldom attacked, no lateral deformity. Hence a lateral view is essential. A little narrowing of the intercostal spaces near the spinal column or an egg-shaped shadow beside the vertebra of a prevertebral abscess, visualized because of its contained bone salts, may be the only evidence in an anterior-posterior view with marked destruction of the bodies. Even these may be lacking. The thickness of the part obscures the periarticular changes in tuberculosis of the hip joint, and the earliest changes observed are actual destruction of the head of the femur, without new bone formation. As healing takes place, the haziness and indistinctness about the joint disappears and the parts become sharp and clear.

The manifestations of syphilis of

bone are as protean as are those of other tissues; however, a few typical pictures present themselves.

Bone lesions showing a purely destructive process are apt to be tuberculosis. Those showing both active destruction and active proliferation are apt to be osteomyelitis, while purely formative processes are apt to be syphilitic.

Three processes are demonstrable —osteochondritis, periostitis and gumma. Osteochondritis appears as a destructive erosion on the shaft side of the epiphyseal line in the developing bone, giving an irregular, serrated effect as if bits of cancellous bone had been torn away with tissue forceps. These areas are filled by granulation tissues of low order. Hence epiphyseal separation and syphilitic pseudo-paralysis are common. Although this process is a destructive one, it is almost invariably accompanied by a striking proliferation of the periosteum of the shaft. There are multiple, discrete layers of new bone parallel to the shaft, the most peripheral being the thinnest. In reality, they are circumferential deposits and form a collar of new bone. The layer formation suggests that each represents a period of activity, followed by a period of latency in the infectious process.

In the tertiary lesions of the acquired form, besides this laminated form of periostitis, we see also the so-called lace-work pattern. The swollen periosteum proliferates about areas or foci of infection, giving a reticulated, moss-like arrangement.

Extensive sclerosis of the periphery of the bone occurs. Scattered through the dense bone will be noted multiple areas of rarefaction. Viewed in profile, these will be seen to be scooped out, meniscus like depressions, which are confined to the substance of the dense new bone, and not scattered throughout the cortex, or endosteal new bone as in pyogenic osteomyelitis.

In the late secondary and the tertiary stages gummata frequently form beneath the periosteum, elevating it and causing some destruction of the cortex. It will be noted that the proliferating periosteum is early making an effectual attempt to limit the infection, and is unbroken except possibly by a minute sinus opening. Accompanying similar lesions are commonly seen.

Obliterating endarteritis and perivascular infiltration about the nutrient arteries cause areas of localized necrosis of worm-eaten appearance. The skull and sternum, particularly, are thus affected.

Charcot joint presents a very striking picture. The joint shows an extreme degree of disintegration out of all proportion to the trivial symptoms. The process is practically painless, hence there is no atrophy of disuse from voluntary limitation of motion. On the contrary, there is always some hypertrophy and bony debris about the joint, usually in great quantity. There is accompanying periosteal proliferation. Besides these features, the Charcot spine shows lateral deformity. The process is probably due to insignificant trauma to a joint, the nerve supply of which has been damaged by a parasyphilitic neuropathy. Eloesser produced a typical Charcot joint in cats by severing the posterior nerve roots and allowing the animals to traumatize the joints.

The presence of a bone lesion is usually pretty well established by the history and physical signs and it goes to X-ray for the primary purpose of determining whether or not the process is a malignant one, and, secondarily, for the further differentiation as to the particular type of growth.

Invasion of the contiguous bone and neighboring soft tissue is the most reliable sign of malignancy.

Because of the ability of the sarcoma cells themselves to absorb bone, there is a destruction en masse, the growth not expanding the cortex, but eroding it concentrically from the point of origin. Benign tumors, due to their slow growth, extend, first up and down the central canal, thence

by pressure cause a spindle-shaped expansion of the bony shell.

Besides the carcinoma and the sarcoma, there are only two other types of tumors that show the characteristic of rapid cortical destruction. These are hypernephroma and myeloma.

Upon the presence or absence of bone production certain growths may be differentiated. The presence of calcareous deposit within a growth limits its possibilities among malignant tumors to osteo-sarcoma and periosteal sarcoma, and among the benign, to osteoma and osteochondroma.

The presence of periosteal bone deposit eliminates bone cyst, giant cell tumor, myxoma and chondroma. In malignant growths, periosteal new bone has a general arrangement perpendicular to the shaft. In periosteal sarcoma, the picture is very striking. The spicules of new bone radiate from the site of origin into the tumor mass, while at the edge of the tumor is seen the broken and flared edge of the periosteum in its ineffectual attempt to limit the growth. The cortex below shows more or less erosion.

Sarcoma of the vertebra is apt to show remarkably little deformity, even after the erosion of more than one vertebra, the consistency of the tumor mass being sufficient to prevent angulation.

As an illustration of the application of these general diagnostic points let us consider Figure No. 1. This lesion shows definite invasion of the cancellous bone of the superior extremity of the tibia. The growth has spread concentrically from the point of greatest destruction, presumably the point of origin. There is no line of demarcation within the medulla between the growth and the normal bone, nor has the epiphyseal line limited the growth. Infections, by cutting off the blood supply to the cartilage, readily absorb it and invade the joint, but neoplasms seldom do. Though the lesion is of comparatively small size, it has eroded the cortex without previous expansion. There is no new bone formation within the growth, but there is a suggestion of slight periosteal proliferation.

A destructive lesion near a joint and not involving a joint, and without regional atrophy, is probably not tuberculous. A single large area, without sequestration, and showing no areas of comparatively normal bone, and little or no evidence of periosteal proliferation, is probably not pyogenic osteomyelitis.

Thus we have a destructive, central new growth, pretty definitely included among the possibilities of cellular sarcoma, metastatic carcinoma, hypernephroma and giant-cell tumor.

Carcinoma, being carried to the bone by the perivascular lymph channels, usually appears first in the long bones near the middle of the shaft, where the large nutrient arteries enter, while the common site of sarcoma is in the ends of the bones. Too, metastatic carcinoma is rare below the knees and elbows. The picture of hypernephroma is similar to that of carcinoma. The giant-cell tumor, tho only locally malignant, does erode the cortex, but not until after more or less expansion, and seldom in a tumor of so small size. The absence of the irregular dark lines and of a line of demarcation within the medulla speak against giant-cell tumor. The tumor proved to be a cellular sarcoma.

Again let us apply this differential diagnostic outline to Figure No. 2. The lesion is a central one of the middle of the left humerus. The cortex is very slightly expanded and is becoming eroded, primarily in one direction. Although the cortex is not yet broken through, the toxic agent has permeated the Haversian canals and stimulated the periosteum to abundant proliferation. This new bone deposit is parallel to the shaft and loose and fluffy in character. It is limited to the region of the lesion. There is no bone formation within the growth itself, but there is a condensation within the marrow cavity above and below. Other bones showed no involvement, neither did the lungs.

Fig No. 1

Fig No. 2

The point of origin at the entrance of the nutrient arteries suggests either blood-borne infection or metastatic malignancy. Among the medullary neoplasms only the central sarcoma and the periosteal sarcoma show periosteal proliferation. The sharp demarcation, the presence of condensing osteitis about the lesion and the absence of the perpendicular arrangement of new bone, pretty certainly eliminate the malignant growths, and the presence of any periosteal new bone excludes, certainly, cyst, giant-cell tumor, the myxoma and chondroma. The absence of toxin in benign central new growths which might permeate the Haversian canals and the inability of the cells to break loose and traverse the cortex through the canals prevent periosteal stimulation and proliferation in this type of growth.

Hence we are likely dealing with an infection. We cannot be certain that we are not dealing with a tuberculous abscess, but the infrequency of shaft involvement and the even more unusual picture of both endosteal and periosteal new bone in this infection speak against it.

The single lesion, without other bone involvement and with a periostitis limited to the area of the acute process are against lues.

The location in the bone, a process of about equal destruction and proliferation, an eccentric erosion of the cortex, with the type picture of periosteal new bone, appearing before rupture of the cortex, and endosteal new bone about the lesion all point strongly to pyogenic osteomyelitis. The process at operation was found to be a localized pyogenic bone abscess.

I am mindful of the fact that I have presented only type pictures. No doubt, in the experience of many of you, there stand out conspicuously certain typical cases which do not conform to these laws. If such be true, it emphasizes the fact that these cases are recalled because these features just enumerated have been applied to them and they are interesting and noteworthy for the reason that they are few, isolated and difficult of classification.

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PNEUMOTHORAX TREATMENT OF LUNG ABSCESS*

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Anyone reviewing the literature on the treatment of lung abscess cannot help being impressed with the inability to secure complete recovery in more than half the cases. The majority of surgeons admit that they have only about 50 per cent or less of cures. The rest of the cases are faced with pulmonary drainage indefinitely by a tube, in order to prolong life; and this with its attending dangers of exacerbation of the abscess, pulmonary hemorrhage from pressure necrosis from the drainage tube, or metastatic abscess in the

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brain in cases of long standing. Neither thoracoplasty nor bismuth injections offer material relief in obliterating the abscess cavity and the persistent drainage (Bevan). In only a small percent of the chronic cases is the abscess cavity obliterated or the discharge checked by surgical drainage. The number of cures is higher in the acute cases, showing the necessity for early intervention.

The operative mortality at the Mayo Clinic is about 35 per cent. Whittmore[1], selecting his cases more carefully, reports an operative mortality of 16 per cent. Probably the average is about 25 per cent. Only about 10 per cent of lung abscesses heal spontaneously. The mortality without operation is about 63 percent (Lord). Walker[2] in a survey of one hundred and thirty-two cases from the literature reports a medical mortality of 54 per cent, a surgical mortality of 25 per cent. Certainly the tendency for the great majority of abscesses with expectant treatment is for progressive lung destruction due to inadequate drainage through the bronchi. The histories of these cases reveal that little hope of spontaneous recovery should be entertained after several weeks of expectant treatment. Yet a great many physicians employ medical treatment for long periods, hoping for recovery. Goldberg and Biesanthal[3] say the medical treatment including posture carries so high a mortality that it is best discarded for surgery. Yet surgical drainage is far from spectacular in its results.

Although the pneumothorax treatment of lung abscess was advocated by Carson of Edinburgh in 1819, it has been very little used until the last five years and even yet to a meager extent.

Tewksbury[4] was the first American to report its successful use (1917), reporting two cases. A great many prominent pulmonary surgeons evidently do not use it at all as it is never mentioned by them in their treatment. That its use is a valuable adjunct to the treatment of these cases is attested by the ever increasing reports of its successful application. Tewksbury, Slyfield, Goldburg and Biesanthal, Simon and Sweezer and many others published reports of its successful use.

The association of lung abscess with operations upon the upper respiratory tract, (particularly tonsillectomy under ether anesthesia), seems well established. It should be borne in mind that the majority of pulmonary abscesses are due to operations on the upper air passages. Of thirty-two cases reported at the Massachusetts General Hospital, 65 per cent were due to operations on the upper respiratory tract under ether. Clendening[5] believes the incidence of pulmonary abscess is increasing, due to motor driven anesthetic apparatus. Moore[6] in a survey of this condition following upper respiratory tract operations, concludes the great majority are due to aspiration of infected foreign material. That they are more frequent in the lower lobes and in the periphery of the lung is believed by the majority of investigators. This fact makes success of pneumothorax more probable as those areas are more readily collapsed.

The later tendency is for adhesions to form from the associated pleurisy. In thirty-five cases coming to autopsy at the Massachusetts General Hospital there were adhesions in one form or another in thirty (Whittemore) showing the necessity for early therapeutic collapse of the affected lung.

Pneumothorax treatment is such a simple and safe procedure that it is surprising that it is not more extensively employed, particularly when considering the discouraging results by surgical drainage. It must be attempted, however, relatively early to circumvent the formation of adhesions which render satisfactory collapse of the lung difficult. There is no reliable method to determine preoperatively whether or not adhesions are present. Frequently a perfect collapse will be attained in a case thought to have extensive adhesions. The compression should be accomplished slowly, however, to avoid shock and discomfort and to avoid displacement of mediastinum. One should be careful that the drainage through the bronchus is not obstructed by the compression, which does occur sometimes. It is a good rule to inject not over 300 c.c. at the initial filling and

gradually increase this at short intervals every day or two until full collapse is attained, controlled by fluoroscopy, to avoid over filling.

It is well known among phthisiotherapeutists that adhesions form very rapidly after the lung is allowed to expand following pneumothorax. In the event that drainage through the bronchus is interfered with by this method the air may be aspirated, enabling adhesions to form rapidly, preparing the field for surgical drainage.

It seems it is the tendency for surgeons to postpone operation until a well defined cavity forms. Some surgeons like to have a fluid level revealed by x-ray before operation is attempted. Such delay allows the condition to become quite advanced and produce extensive lung destruction, which is not necessary if there is a free pleural cavity. Pneumothorax can be used as soon as rupture into a bronchus occurs which is usually early.

Lynah[7], using bronchoscopic aspiration reports good results from this method of treatment. He is enabled by the bronchoscope to dilate or remove any obstruction to free drainage that exists. He thinks some of the benefit may be due to the effect of the x-ray after bismuth injection which is used to map out the abscess cavity. He advocates bronchoscopy as soon as purulent expectoration is present even in the pneumonic stage. At all events this method is a valuable aid in the diagnosis, localization and treatment of these unfortunate cases, but requires expertness and large experience with the use of the bronchoscope.

The results of pneumothorax are so rapid, complete, and attained by such a simple procedure, that it is to be preferred to any other method of treatment. In view of these splendid results it seems to us that the most rational procedure to follow in the treatment of lung abscess would be:

1. Wait no longer than two weeks for decided clinical improvement; then,
2. Institute pneumothorax; in the few cases in which this is not successful,
3. Drain surgically.

A typical result of lung collapse in lung abscess is illustrated by the following case:

No. 1—R. T. 15-year-old school girl.

Past history negative. On October 15, 1921, had tonsillectomy under ether anasthesia. One week later developed fever, cough and expectoration and pain in right chest. Soon after began to raise foul smelling green sputum.

X-ray examination confirmed diagnosis of an abscess cavity in lower right lung. No improvement was observed after two weeks of medical treatment and on November 11th, 200 c.c of nitrogen gas was injected into her pleural cavity. These injections were continued every other day for four treatments then every four days until the right lung was collapsed as revealed by the fluoroscope. The fever and cough gradually disappeared and the patient gained in weight. The injections of gas were continued once every two weeks for two months after which time she left town, and now, on June 1st, when she reported for x-ray examination is clinically well.

No. 2.—J. M. Male, twenty-eight years. Ex-service officer.

Had influenza in army and after a few exacerbations apparently recovered. Had tonsillectomy under ether anesthesia about month later. Following this was in fairly good health for about two months then gradually developed cough and expectoration. Discharge became worse, began to raise foul green pus, run fever and lose weight. Examination revealed lung abscess in right lower lung. He was treated medically for about eleven months before coming to Tucuson when pneumothorax was begun. With complete collapse, the toxemia increased, fever increased with diminution of sputum and general condition worse. The air was then aspirated and after a few days the abscess cavity was drained and a tube inserted. Following this, patient had a stormy time, later developing empyma which was drained. He gradually recovered from this and became in good health except for a small discharge from the abscess drainage which persisted for about one year and closed. He is now in excellent health.

This case is cited to emphasize the necessity for early pneumothorax thus preventing the formation of scar tissue in the abscess wall.

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X-RAY THERAPY OF THE TONSILS AND ITS LIMITATIONS*

WILL WILKINSON, M. D., Phoenix, Arizona.

Every diseased appendix should be removed. Does the same rule apply to the diseased tonsils of childhood and youth?

For four years Dr. Littleton Davis kept records of the tonsillar conditions in several thousand school children at Roanoke, Va. Very large unhealthy tonsils were marked three plus; he states that from year to year about an equal number progressed ing dose of tubercle bacilli received dowward from three plus. He also states that cervical glands enlarge as often after, as before, removal of the tonsils. Since, during childhood, a large number of the hypertrophied diseased tonsils regress and become healthy, I believe we should assist nature in her efforts at conserving the tonsils of children, rather than removing them.

In a child's throat, an enlarged tonsil, not markedly reddened, is probably performing an important function. Colonel Bushnell has emphasized the importance of the immunizing of dose of tubercle bacilli received bv inspiration and ingestion during childhood. It is probable that the tonsil, by collecting and digesting pathogenic bacteria, plays an important role in immunizing the child to infection.

All enlarged, infected tonsils and adenoids in children and youth shrink and become healthy after a few x-ray treatments. Parents should be so advised and whenever the public comes to understand that radiation cures the infected tonsils of childhood, the method will become popular.

A chronically infected tonsil in time becomes fibroid in character, since this is nature's favorite method of walling off infected follicles and other foci of chronic infection. Whenever there is clinical evidence that infected fibroid tonsils are injurious to the health of the patient we should recommend and insist on tonsillectomy. Should there be any contra-indication to the operation, the case may be successfully treated with radium or by electro-coagulation.

In both children and adults it frequently happens that removing the tonsils gives but partial relief. There may still be considerable discomfort and clearing of the throat, with attacks of sore throat accompanied by slight temperature, but without the malaise and prostration that accompany an attack of tonsilitis. These throats with infected and enlarged lymph follicles will clear up promptly under x-ray treatment. Thus, in order to get a healthy pharynx, the throat and x-ray men must frequently co-operate.

Witherbee, the originator of the method, has successfully treated several hundred cases of diseased tonsils, and states that there is no contra-indication to x-ray treatment. The danger of injuring the thyroid, parotid or pituitary gland is remote, as it is rarely necessary to give more than eight or ten treatments to the tonsils, while cervical tuberculous glands often require two to four times this number of exposures, with no injurious effects upon these neighboring glands. In ringworm of the scalp the pituitary receives heavy doses from five portals, all directed toward the pituitary, and no one has observed any injury to this gland. With the Witherbee technic for treating tonsils, the surface receives only one-fourth of a full skin dose; consequently there is no danger of an erythema developing.

There has been some question as to the permanency of the results in x-rayed tonsils. Several radiologists have inspected the throats of patients treated during the past ten years for tuberculous glands in the neck, and

*Read before the Arizona State Medical Association, at Prescott, Arizona, June 14-16, 1922.

have found their throats uniformly healthy. As many such cases have unhealthy throats and as the throat and tonsils are rayed in treating cervical glands, we must conclude that the results following x-ray treatments of unhealthy throats are permanent.

Surgical removal of the tonsils and adenoids may have any of the complications which are produced by septic emboli, such as lung abscess, empyema, phlebitis, and endocarditis. Other occasional complications are hemorrhage, which is much less frequent than formerly, since our throat men do not usually operate until the coagulation time is normal, and middle ear trouble or mastoiditis, which may complicate the recovery.

The advantages of the x-ray treatment are no anesthetic; no hemorrhage; no severe convalescence or loss of time; no discomfort or complications.

Cases of rheumatism, chorea, diabetes, chronic endocarditis and hemophilia are usually poor surgical risks. When such cases have diseased tonsils, x-ray treatment would seem to be especially indicated.

Occasionally a concealed abscess has been apparent in the fibroid tissue left after absorption of the lymphoid tissue following x-ray treatment. Isolated by fibroid tissue, such abscesses become sterile and are harmless. In this connection, it is of interest to note that Dr. Hickey, of Detroit, reports treating the throats of diphtheria carriers and was able to rid their throats of diphtheria bacilli in from two to four days in 80 per cent of the cases treated.

RADIUM AND ITS ACTION ON LIVING TISSUE CELLS*

W. WARNER WATKINS, M. D., F. A. C. P., Phoenix, Arizona.

It would be presumptuous in a physician to attempt a scientific discussion of radium before a body of men and women versed in the natural sciences, since that subject primarily concerns physics, chemistry and geology, and bears closely on the philosophic sciences. But a member of one branch of applied science can properly speak to the representatives of general science concerning the applications, within his own field, of the knowledge which has come from the wider realms of scientific research. Without discounting any of the wonders of this marvelous element—radium—in its purely physical and chemical manifestations, or its influence on our intellectual conceptions, certainly the application of radium which is most prominent in the thought of people is its use in treating disease through its biological effects on living matter.

The developments in connection with radium and radioactivity furnish the best possible illustration that medicine is inseparably linked to all other branches of science, as members of one general family. Many of the most important discoveries of the pure sciences have found their greatest usefulness in the practical applications of applied biology, i. e., medicine. Time forbids an enumeration of these, but a most striking example of progressive discovery is that presented by Crookes, who discovered cathode corpuscles and prophetically called them "radiant matter"; Roentgen, who, working with a Crookes tube, discovered x-rays; Becquerrel, who with x-rays in mind, detected radioactivity in uranium ore; and Madame Curie, who, in searching for the cause of this radioactivity, discovered radium. Without these antecedent discoveries and the subsequent elaboration of our knowledge

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of radioactivity, by Rutherford, Soddy, Ramsay, Wilson, Moseley, and others, there could, of course, have been no biological applications. On the other hand, without the practical applications of the physical properties of radium in biological fields, radium would be a laboratory curiosity today, instead of the most valuable and costly substance known. It is valuable because it can be used to relieve human suffering, and it is costly because it is rare. The applications which applied biology (medicie) makes of the discoveries of its sister sciences are priceless contributions to general science, and all the devotees of the natural, philosophic and pedagogic branches of science must remember this. The healing of a case of cancer, or the eradication of tuberculosis from a child is just as valuable a contribution from science to the world's progress as the discovery of a new star or the evolution of a theory of relativity.

In order properly to introduce even a summary of the effects of radium in the biological realm, it will be necessary to give a brief review of its physical and chemical properties. To do this we must have in mind the fundamental structure of the atom.

The Atom: The structure of the atom has been revealed to us, little by little, through the researches of numerous workers, and a wonderful impetus was given these researches by the discovery of radium and radioactivity. We cannot follow the steps in this brief summary; suffice it to say that the atom, which was once regarded as the final and individual particle of matter, is now known to be a world in itself, more complex in its internal structure than any machine ever conceived by man. Its essential portions are (1) a central compact nucleus which, in proportion to the whole atom, is about like a marble in the center of a lot a half mile in diameter. Yet into this nucleus are packed still smaller particles of matter, called "electrons." There are, in the nucleus of any atom, approximately half as many electrons as the atomic weight figure of the element to which the atom belongs. These electrons in the nucleus carry positive electric charges, thus deriving their name of "electrons." (2) Outside of the nucleus, in the vast outer spaces of the atom, are other electrons, the exact number of which are equal to the number of positive electrons in the nucleus. These outer electrons carry negative charges of electricity and probably revolve around the central nucleus much as the earth and other planets revolve around the sun. The space between the negative electrons is so great as compared with the size of the electrons, that these have often been compared to the planets and the atomic free space to the interplanetary space. Millikan has said that the electrons in the atom are about like particles of dust in a large room.

In this conception of the atom, the hydrogen atom consists of a nucleus with one positive electron and one accompanying negative electron. The helium atom has a nucleus with two positive electrons and two satellites of negative electrons. It is now considered fairly certain that each of the heavier elements, at least, has just as many positive electrons in its nucleus as its number in Moseley's table, and a corresponding number of negative electrons in the outer atomic spaces. Thus radium will have a nucleus of 88 positive electrons, with the same number of accompanying negative electrons. In all atoms the positive charges of the nucleus exactly neutralize the negative charges of the free electrons, the atom being in a condition of equilibrium.

Ionization: When any atom becomes divested of one of its negative electrons by application of force, it is left with a surplus positive charge, while the freed electron has a surplus negative charge. These resulting fragments of the atom are said to be ionized; they are, by this means, set in motion and are capable of physical and chemical effects, upon other

atoms. We shall soon see that one of the most important effects of radium upon other kinds of matter is due to its power of ionizing atoms.

Radioactivity: The one fundamental property of radium with which we are concerned is its radioactivity. Even our physical knowledge of radioactivity is by no means complete and we are barely on the threshold of our knowledge of its effects upon living cells exposed to its rays. Radioactivity is due to the spontaneous disintegration of the radium atom. This atom is just like any other material atom until it explodes, or disintegrates. The cause of this explosion is still an unsolved riddle, but many of the effects of the explosion are known. Out of every 100 billion radium atoms, one explodes every second, but the number of atoms is so infinitely great that in the smallest visible particle of radium, so many atoms are disintegrating every second that there is a constant stream of innumerable rays. The result of the atomic disintegration consists of four distinct products with which we are concerned: (1) A particle of an element entirely distinct from radium; this is the alpha particle, which is in reality an atom of helium, or probably simply the nucleus of the helium atom, divested of its two negative electrons and shot off as a positively charged nucleus; (2) a negative electron torn loose from the radium atom by the explosion—called the beta ray or particle; (3) the main residue of the radium atom which comes off as a radioactive gas, called the radium emanation; this gas has all the properties of radium except its length of life; (4) very penetrating rays, called gamma rays, akin to light rays, but of very much shorter wave length.

The alpha rays or particles are shot off with a velocity of about 10,000 miles per second, and in their air flight they pass diretcly through gaseous atoms, traversing the spaces between the electrons. In air, they have a range of about 7 cm. and in this distance they will penetrate something like half a million atoms of atmospheric gases. The investigation of the flight of the alpha particles, and their adventures when they collide with electrons or strike the nuclei of other atoms, is one of the most fascinating chapters in scientific research, but cannot be dwelt on here; due to their limited flight and the fact that they cannot penetrate denser matter than gases, their biological application, which is the theme of this paper, is limited.

The *beta rays or particles*, negatively charged electrons, are shot off with a speed ten or more times greater than that of the alpha rays, some of them attaining the speed of light (186,000 miles per second). They also pass directly through the atoms which lie in their path. The beautiful work of Wilson in photographing the courses of these electrons shows that a beta ray will pass through as many as 10,000 atoms before it will happen to strike another electron, dislodge it and form an ion. The beta rays are more penetrating than the alpha particles. They are identical with the cathode corpuscles of the Crookes tube, except that they are traveling at a much higher speed.

The gaseous residue of radium,—called the *emanation*, will not be discussed in this paper.

The gamma ray of radium, unlike the other two, is not a material particle, but is the result of violent electrical disturbance within the atoms. Just as x-rays are produced by the impact of cathode corpuscles upon the metallic target, so the gamma rays are probably the result of the impact of the beta rays (which are the same as high-speed cathode corpuscles), against the other radium atoms. The gamma ray is a light ray, and when the physicists have determined what light rays are, we will know what gamma rays are. We know that visible light rays, ultraviolet rays, x-rays, and gamma rays are all akin, varying only in the shortness of their wave lengths. The visible light rays have a wave length from 8000 Angstrom units for red light to 3500 in the violet and 2000

in the ultraviolet; x-rays have a wave length of 8 to .5 A units; while gamma rays have a range from 1.2 to .07.

Whenever x-rays or gamma rays strike an atom of matter a negative electron is dislodged from that atom and shot off—an ion being formed. The shorter the wave length of the ray, the greater the velocity of the dislodged electron. The gamma rays of radium are the most penetrating of any known rays, and will pass through several inches of lead. There are now being manufactured electrical apparatus which will develop x-rays of a penetration approaching that of radium. This requires x-ray tubes which will allow the passage of a current with a potential above 200 kilovolts, and this will only give a ray equal to the least penetrating gamma ray.

Since all electrons are alike, so far as we know, those dislodged by x-rays or radium from atoms which they strike are the same as the beta rays of radium. So that one of the effects of gamma rays in passing through matter or living tissue is the manufacturing of beta rays in its track.

The cells of living tissues, made up of very complex molecules which consist of atoms of various elements, share with all matter the effects of exposure to radioactive energy. In living tissue, these effects are much more marked, because the changes produced are more striking.

The alpha particles cannot penetrate beyond the superficial layer of tissue cells. However, since more than 90 per cent of all the rays from radium are alpha particles, those cells which are exposed to alpha bombardment are profoundly affected. We do not yet know just what is done to the protein molecule either by the positively charged helium nucleus (alpha ray), the negatively charged electron (beta ray) or the energy of the gamma ray. Whether the ionization of the simpler atoms results in new chemical combinations which, if carried far enough, will cause death of the cell, we are not certain. We do know that the most profound effects are exerted on the cells which are least differentiated. That is, those cells whose energy is expended chiefly on growth or reproduction, rather than function—such as sperm cells, lymphoid cells, vegetative tumor cells, are most easily affected. These effects may be of varying degrees. When applied to a limited degree, the functional activity of the cells of secretory glands are stimulated. If applied in larger measure, there is destruction of the power of reproduction, or molecular degeneration in the cells.

In practical use, the gamma rays are used almost exclusively. The alpha particles are filtered out because their energy would so quickly destroy the superficial cells. The beta particles are filtered out because the gamma rays will produce the beta particles in the tissues, and the beta rays of radium are of limited penetration. In applying radium to human issues, the radium salt is enclosed in a glass tube, hermetically sealed. The glass filters out or stops the alpha rays. This tube is enclosed in a metal capsule which filters out the beta particles. Since the gamma rays, in passing through the metal of the capsule, forms beta rays on the outer surface of the metal, this metal capsule is enclosed in a rubber tube to filter out these secondary b-rays. When a cancer is treated, advantage is taken of the fact that the cancer cell is a vegetative cell only slightly differentiated as to function. This type of cell is more easily killed by any physical or chemical agent than is the normal tissue cell. So, by subjecting the cancer cells to a dosage sufficient to kill them, but not sufficient to kill the tissue cells, we can frequently eradicate the cancer. A high degree of technical skill and judgment is required to accomplish this. For example, if a cancer is situated beneath the skin and is to be attacked with radium, the rays with which we attack the cancer must be passed through the skin without in-

jury to that structure and be delivered into the cancer in sufficient quantity to kill the cancer cells. Since the energy of the gamma and all other light rays decreases in ratio with the square of the distance traveled, in order to deliver a sufficient dosage into the most distant portions of the cancer, it may be necessary to approach dangerously near the tolerance of the skin for the rays passing through it. It is not to be wondered at that some skins are burned with radium and x-rays; the marvelous thing is that many more are not injured. The skin is protected, to some degree, by estimating the proportion of the gamma rays which will be of low range, and filtering these out by interposing some substance between the radium and the tissues to be protected.

The treatment of cancer by radium through its destructive effect, is now an old story, and will not be discussed at this time.

MARICOPA COUNTY MEDICAL SOCIETY

The cordial and generous invitation of the Sisters at St. Joseph's Hospital to donate quarters for the Society has been accepted by the officers. In the future, the Society will hold their meetings in the lecture room of the Hospital on the first and third Saturday evenings of the month. The County Society library will be located in the old dressing room for the doctors, just east of the main entrance. The books and magazines have been placed in the room and arranged for the use of the medical profession. About forty magazines are available and more will be provided. The library has a toilet and bathroom attached and its convenient location will soon make it of great value.

The first meeting of the season was held on October 21st, with a very good attendance. Several matters of routine business were disposed of, and announcements of the program for the winter given by the Secretary, Dr. Fred Holmes.

Dr. R. J. Stroud, of Tempe, showed two very interesting clinical cases. The first one was an echinococcus cyst of the liver, diagnosed sterile at present. The second was a tuberculosis involving the periarticular structures of the knee, following trauma, diagnosed as a primary tuberculosis of the muscle or tendons about the knee joint.

Dr. Warner Watkins read a paper on "Malta Fever", introducing a discussion on the recent epidemic of this disease in Phoenix. At least thirty cases have been recorded. The source of the infection was soon found and eliminated by the health authorities, the epidemic lasting about ninety days.

On November 2nd, the Maricopa County Society had the pleasure of entertaining Dr. E. C. Rosenow, head of the Research Department of the Mayo Foundation. Dr. Rosenow was en route to Los Angeles to appear before the Southern California Society and stopped off at Phoenix. On account of train connections, it was necessary to hold a noon meeting. Notices were sent to all the doctors in the state and quite a number from outside the county attended the meeting. The subject being one which is of interest to dentists, invitations were extended the dentists of the state to attend, and they responded very cordially.

Following a luncheon at the Adams Hotel, at which nearly a hundred physicians and dentists were present, Dr. Rosenow gave his lecture on "The Production of Nephritis and Nephrolithiasis in Dogs by Devitalization of Teeth and Insertion of Organisms Isolated From Cases of Nephritis." He also spoke briefly on "Epidemic Hiccough and Its Production by Injection of Organisms Isolated From Human Cases." Both subjects were well illustrated by lantern slides.

Among the visiting doctors present were Dr. R. D. Kennedy of Globe, Dr. Sawyer of San Carlos, Dr. O. D. Wilson of Prescott, Dr. E. S. Miller of Flagstaff, Dr. Taylor of Camp Verde.

On account of Fair Week and the recent meeting with Dr. Rosenow no meeting was held on the regular meeting night (November 4).

ST. JOSEPH'S HOSPITAL, PHOENIX

The meetings of the staff of St. Joseph's Hospital, at Phoenix, began in October. The first meeting was held on Saturday night, October 14. Dr. Milloy presented the clinical record of an interesting medical case, with details of physical examination, laboratory findings and course of disease. This patient had died and autopsy findings of Dr. Mills were given. It was primarily a case of arteriosclerosis, with secondary kidney changes and terminal acute infection of kidneys, lungs and spleen.

The clinical manifestations of malta fever were discussed, using the records of two or three cases who had been for several weeks in the hospital.

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Information of interest to all readers, together with directory of officers of the constituent societies and the Board of Managers of this magazine, will be found following the Table of Contents on pages 1 and 2 of the Advertising Section.

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THE SOUTHWESTERN MEETING

The medical event of the year, which is the annual session of the Medical & Surgical Association of the Southwest, will be in El Paso, on Dec. 7th, 8th, and 9th. The chairman of the Program Committee, Dr. H. H. Stark, is not yet able to announce the complete list of papers, but three of the visiting essayists will be the following:

Dr. Chas. L. Lowman, of Los Angeles, will show a motion picture film on the subject of locomotion, illustrating various abnormal gaits with both the usual speed and the low speed camera.

Dr. J. Curtis Lyter, of St. Louis, will have a paper on "Some Experimental Aspects of the Physiology of the Mediastinal and Pulmonary Lymphatics."

Dr. Rex Duncan, of Los Angeles, will have a paper on "Grading of Epitheliomata and their Radiosensibility."

The full program will be mailed to the profession of the southwest in advance of the meeting.

The usual program of clinics in the forenoon and scientific papers in the afternoon, with social gatherings in the evening, will be followed.

EE PASO COUNTY MEDICAL SOCIETY

The El Paso County Medical Society met in regular session on September 18th with 42 members and 7 visitors present.

Drs. E. D. Price and G. Werley reported a case of a woman, age 19, who gave a history of rheumatism and whose present condition had been diagnosed as tuberculosis. When seen by Dr. Price on September 9th she gave a history of having had several chills during past few days, general weakness, loss of weight, elevation of temperature, in general, the usual symptoms of tuberculosis. Examination revealed nothing abnormal in the lungs. The heart, however, was enlarged, and a systolic murmur could be made out at the apex and the spleen was enlarged. Blood count showed 2,500,000 reds, 16,000 whites with 87 per cent polynucleara. The Wassermann was negative. A blood culture on the third day showed the presence of streptococcus viridans. The whole picture was that of a classical case of subacute streptococcic endocarditis and death resulted on September 15th. A partial autopsy was obtained which showed normal lungs, and enlarged heart with the typical vegetations on the mitral valve and to a less extent on the aortic valve. The heart was demonstrated by Dr. G. Turner.

Dr. R. L. Ramey read a paper "The Treatment of Compound Fractures", in which he advocated giving immediate attention to all compound fractures and in his hands the following procedure has given excellent results: He anesthetizes the patient, thoroughly cleans the wound with soap and water and, if badly lacerated, practices debridement. Ether is then freely used in the wound followed by one-half strenth Tr. Iodine. The wound is only loosely closed with drainage provided and dressings and splints very loosely applied after getting the fragments in proper alignment. He does not believe in plating compound fractures except in rare instances when the fragments will not stay in alignment, and neither does he believe it good surgery to tightly close the wound.

Dr. Ramey's paper was discussed by Dr. W. L. Brown, who stated that wounds such as

just described are ideal for the use of Dakin's solution and that in his opinion the early temporary splinting by means of plates, etc., is justifiedd in cases where deformity is liable to result.

Dr. B. F. Stevens, in discussing the paper, called attention to the use of anti-tetanic serum and stated that Ivory soap and water will remove infecions and that lately he has been getting good results from the use of Mercurochrome.

Dr. K. D. Lynch read a paper, "Some Observations on Kidney Infections", in which he recounted briefly the average run of kidney cases as seen in general practice, taking up in order Pyelitis, Pyonephrosis, Tubercular Kidney, Cortical Infections, Septic Infarcts and Abscess. Many cases of Pyelitis, he stated, are diagnosed as stone because of the blood in the urine and pain over the affected kidney. In ordinary Pyelitis cases cure is effected by pelvic lavage except in the presence of stone and stricture. When these conditions are corrected it is found that the infection yields rapidly as in simple and uncomplicated cases.

In tubercular kidney, Dr. Lynch believes it is advisable to lavage with ½ to 5 per cent phenol even in those cases where it is intended to remove the kidney. Certain cases seem to improve under lavage and cure may be effected. In support of this statement three cases were reported that had been apparently cured by lavage, one case having now passed his seventh year without a return of trouble. He believes in conserving a kidney if possible. He has found it necessary in four cases to do a secondary ureterectomy after nephrectomy for tubercular kidney before the patients became well.

Cortical infections, in Dr. Lynch's opinion, are more common than ordinarily supposed and clear up without treatment unless they develop into abscesses. When necessary such infections as well as single and multiple abscesses are best treated medically and surgery resorted to only as a last resort. Some go on to chronic pyelitis and for those lavage is necessary after the acute symptoms have subsided.

Dr. F. P. Miller reported for the General Arrangements Committee for the past state meeting that all matters concerning the meeting, finances included, had been carried to a successful conclusion. The committee was discharged with a vote of thanks.

Leut.-Col. M. A. W. Shockley, the new Commanding Officer at the William Beaumont General Hospital, together with Major Chester R. Haig, of the Medical Section of the same hospital, were elected to honorary membership.

SELECTED ABSTRACTS

Roentgen Therapy of Hyperthyroidism. I. W. Jenkins, M. D., Waco, Texas. Texas State Jour of Med., Vol xviii, No. 4, Aug. 1922.

(This paper was part of the symposium on goitre before the Surgical Section of the Texas State Medical Association, at El Paso, May 10, 1922.)

Radio therapy is applicable only to the exophthalmic or hyperplastic and the toxic adenoma. All other forms should be treated surgically or medically. Holmes' classification is useful in selecting the kind of treatment, namely, (1) colloidal, cystic or simple goitre; (2) malignant goitre; (3) toxic adenoma; (4) nontoxic adenoma; (5) exophthalmic goitre.

In malignant goitre, if possible, surgery should be used, preceded and followed by radiotherapy.

Always there should be a thorough physical examination, since the hyperthyroidism may be a secondary manisfestation of some focal infection; when menstruation is excessive without detectable pathology, raying the ovaries is indicated. Clinical improvement precedes a change in basal metabolism.

Syphilis of the Colon. J. P. Keith, M. D., Louisville, Ky. Southern Medical Journal, Vol. xv, No. 9, Sept., 1922.

Author's experience would incline him to the belief that syphilis of the colon is not so rare as the infrequent mention of it in the literature would lead one to believe. He gives three case reports. The main difficulty in diagnosis is betwen malignancy and tuberculosis; a gumma with ulceration may give a radiographic picture very similar to that of malignancy; where the syphilitic stricture is smooth, especially if it is multiple, the absence of pain and positive Wassermann are aids in differentiation. Tuberculosis usually involves the cecum and ascending colon, while syphilis is more likely to occur in the transverse and descending colon; syphilis does not have the intolerance to filling that tuberculosis has.

The Treatment of Cancer of the Breast. Frederick H. Kuegle, M. D., Sioux City, Iowa. Minnesota Medicine, Vol. V, No. 10, October, 1922.

Since even with the best of surgery, the ultimate history of breast malignancies is anything but encouraging, the attention naturally turns to the applicability of radiant energy as an adjuvant to surgery in such cases. The question is considered under three headings, namely, (1) as a pre-operative measure, (2) as a post-operative measure, (3) as a palliative in recurrent and inoperable cases.

From the best figures available, when a woman presents an established breast cancer with palpably affected axillary nodes, she has about one chance in 25 of being cured by operation. If extensive x-radiation is administered by approved modern technic, there will be marked recession of glandular enlargements, the cancer cells will be killed or encapsulated, the smaller lymph channels will be obliterated and tendency to metastases lessened. These are all desirable accomplishments, and if a period of three to four weeks are allowed to elapse, operation will be attended with a minimum risk.

Statistics show that more than one-half of all operated cases recur within four years, so that any method of treatment which can be used as an adjuvant to surgery and which will retard this high percentage of recurrence, should be used. Every case of breast cancer which is operated and confirmed by pathological examination should, therefore, receive post-operative x-ray treatment. Properly administered this treatment will give definite results; any deep-seated cancer cells which have escaped the knife will be killed outright, or be so attenuated in virulence that they can become encysted. The operative scar will be rendered soft and pliable and entirely painless.

As a palliative in hopeless cancers, no other known treatment approaches the usefulness of radiotherapy in relieving pain, foul discharges and making the terminal stages comfortable.

Central Bone Tumuors and Their Differential Diagnosis: With Special Reference to the Latent and Unhealed Bone Cysts in Adults. Joseph Colt Bloodgood, M. D., Baltimore, Mr. Minnesota Medicine, Vol. V, No. 10, October, 1922.

The author reported in the Journal of Radiology, for March, 1920, fifty-four cases of bone cysts, in six of which the onset occurred after the age of twenty. He again reviews these six cases, and propounds the question, "What shall be our procedure of attack when an adult comes under observation with an x-ray picture showing the central lesion with an intact bony shell, with or without evidence of a recent fracture?"

The possible central lesions are,—benign giant—cell tumor, central sarcoma, bone cysts, chondroma and myxoma, tuberculosis, chronic osteomyelitis, multiple myeloma, metastatic tumors, multiple primary central sarcoma.

When is exploration justifiable in central bone lesions with intact shell, with or without recent fracture? This refers to central lesions in patients over fifteen years of age. The unhealed bone cyst should be curetted. The central giant cell tumor does not require radiotherapy; it will not recur if curetted properly with chemical or thermal cauterization. If a chondroma or myxoma is revealed by operation, curetting with cauterization offers more hope than radiotherapy. If the rare central sarcoma is revealed by the operation, it would seem justifiable to curette with the cautery, with chemical disinfection, followed by radium in the bone cavity. If one explores a central tumor with an intact bony shell and is unable positively to rule out sarcoma, the treatment should be most thorough destruction with the cautery, then swabbing the bone cavity with pure carbolic acid and alcohol and 50 per cent chloride of zinc, following this by the introduction of radium; this to be followed up by post-operative x-ray and radium treatment.

BOOK REVIEW

THE SURGICAL CLINICS OF NORTH AMERICA, issued serially, one number every other month. Vol. LI, Nos. 1, 2, and 3, (Philadelphia, San Francisco and Chicago numbers), 882 pages, with many illustrations. Per Clinic year (Feb., 1922, to Dec., 1922.) Paper, $12.00 net. Cloth, $16.00 net. Philadelphia and London: W. B. Saunders & Company.

To the reviewer the Philadelphia Clinic number is one of the most interesting, as well as one of the most instructive along the lines of ordinary, every-day cases, that has appeared for some time. To realize this, one has to note that it contains clinics by Deaver, DaCosta, Ashburst, Frazier, and others not so well known, but who, nevertheless, present interesting subjects. The clinic of Dr. John B. Deaver seems to be a nearer approach to the pioneer work of Dr. John B. Murphy than any other we have seen; that is, it seems to carry more forcibly the personality of the clinician. Deaver's clinic dwells upon problems that may confront the surgeon any day, such as carcinoma of the breast, transperitoneal hysterotomy, recurrent cholecystitis, pyelotomy for renal caloulus and an interesting cyst of the liver. One of these may be of particular interest because in this southwest country we meet an unusually large number of renal stones, probably due to the heavy intake of water with a considerable mineral content, necessary to supply the loss by excessive perspiration. The clinic on recurrent cholecystitis helps clear many difficulties. For example, he always tells why he uses drainage after cholecystectomy. Those who adhere to the fad of closing without drainage might read this with profit.

Any article by Charles H. Frazier will be gladly received, especially by those who have his new work on the spine and spinal cord. This clinic takes up brain tumors in relation to the cerebro-spinal fluid and ventricles. Ventriculography is discussed, together with problems that may arise on the operating table. Uses for the method of dehydration by sodium chloride that has recently come into use are explained and cisternal puncture is illustrated. The San Francisco number contains a clinic on a series of spinal cord tumors that has interesting features. Here is made the statement, probably correct, that most spinal cord tumor cases pass through from four to twenty hands before the diagnosis is made. Spinal cord compression is not difficult to diagnose if one simply remembers that increased patellar reflexes, paraplegia and a rather definite upper level of sensory involvement point toward the tumor. The great frequency of syphilis of the cord should not blot out the possibility of an occasional diagnosis of compression.

The Chicago number contains clinics on a wide variety of subjects. Following the operation of pyelotomy for stone in a floating kidney two years after nephrectomy on the opposite side, A. J. Ochsner discusses the measures that should be used in combating the re-

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currence of stone. While foods may have some influence the important point is the drinking of at least one-half gallon of distilled water every day. Personally, we believe the S. G. of the urine should be kept well under 1020 by the use of distilled water. Mix gives a methodical description of "dumping stomach" following gastro jejunostomy. Holstead uses transplants of fascia lata to replace defects in the dura. The writer has successfully used periosteum from the outer surface of the skull inverted for duroplastic repairs. A clinic of several cases of gun-shot wounds of the kidneys is followed by an extensive discussion of the types of injury and the treatment of each type, as well as the treatment of shock, hemorrhage and injuries to other viscera. This number also contains a case of tumor of the spinal cord by Bevan and his interesting observations. In connection with common duct obstruction he prefers to rely on external drainage rather than cholecystenterostomy because of the danger of infection ascending to the liver.

Kretschmer discusses traumatic kidney from the standpoint of the industrial surgeon. Valuable points are brought out in connection with hemorrhage, diseases present prior to injury, and liability due to wrong interpretation of x-rays. All togeher, the clinics for this half-year are probably the most interesting and instructive yet published. E. B. R.

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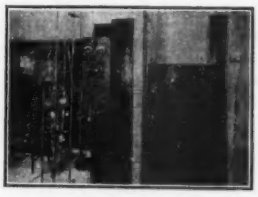

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